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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Vlad J. Novotny

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12/28/2004

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EXAMINER

STAHL, MICHAEL J

ART UNIT

PAPER NUMBER

2874

DATE MAILED: 12/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/035,829

Applicant(s)

NOVOTNY ET AL.

Examiner

Mike Stahl

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 October 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2,4-8,10,16-19,22-31,33-51,69-71 and 73 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 2,4-8,10,22-24,26,40 and 43-51 is/are allowed.
- 6) ☒ Claim(s) 16-19,25,27-31,33-39,41,42,69-71 and 73 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

This Office action is in response to the amendment filed October 7 2004. Claims 2, 4-8, 10, 16-19, 22-31, 33-51, 69-71, and 73 are pending.

It is noted that the status identifiers for several claims are incorrect. Claims 24 and 26 are identified as "previously amended" but they are actually currently amended. Claim 27 is identified as "currently canceled" but it is actually currently amended. Claim 40 is listed as "original" but is actually currently amended. Finally, claim 72 is listed as "currently canceled" but the text of the claim is still printed. It is understood from applicant's remarks at p. 18 that claim 72 is indeed canceled (as its limitations were absorbed into claim 69).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 71 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Now that claim 69 has been amended to recite that "the arm lengths of each hinge become progressively longer from the first end to the second end", claim 71 is in conflict because it requires that the hinge arm lengths get shorter from the first end to the second end. Since both conditions cannot be satisfied simultaneously, claim 71 will not be further treated in this action with regard to prior art.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 69-70 and 73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Plesko (US 5506394).

Claim 69: Plesko discloses an MEMS actuator comprising: a support structure **115/123**; a movable optical element **52**; and a plurality of serpentine hinges (part of suspension **48**) extending between the movable optical element and the support structure, each hinge including a number of arms with a number of arm lengths. See figs. 16 and 17. Although Plesko shows the arms of the serpentine hinges getting shorter from the support structure end to the optical element end, which is opposite to what claim 69 requires, the specific shape of the hinges is not

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described as a critical aspect of that invention. It would have been obvious to a person having ordinary skill in the art to use any appropriate shape for the serpentine hinges. One motivation for having the arms increase in length as they proceed from the support structure end to the optical element end is that this would require a shorter overall hinge length and would advantageously reduce the amount of material needed. The resulting reduced mass would also beneficially reduce the rotational inertia of the device, which could enable faster movement of element 52.

Claim 70: The arms are curved from a perspective normal to the optical element.

Claim 73: The hinges define at least one axis of rotation, and at least one of the arms extends parallel to that axis (see e.g. the x-axis as defined in fig. 16).

Claims 16-19, 25, 27-31, 33-39, and 41-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Neukermans et al. (US 6445844) in view of McClelland et al. (US 6201629).

Claim 16: Neukermans discloses an apparatus (figs. 13-16a) comprising: a support structure 224 having a plurality of optical device assemblies 222 formed thereon, wherein the optical device assemblies include: an optical element 184 having an outside edge joined to the support structure by pairs of serpentine hinges 176 and 182; driving elements 214 configured to deflect the optical element; wherein the serpentine hinges include at least one winding having two arms; and wherein the movable optical element and the hinges are formed in a common material layer 166 (see figs. 12 and 15). The movable optical element may be regarded as a blocker, at least in the sense that it can block a beam from reaching a given output port by being deflected to engage a different output port.

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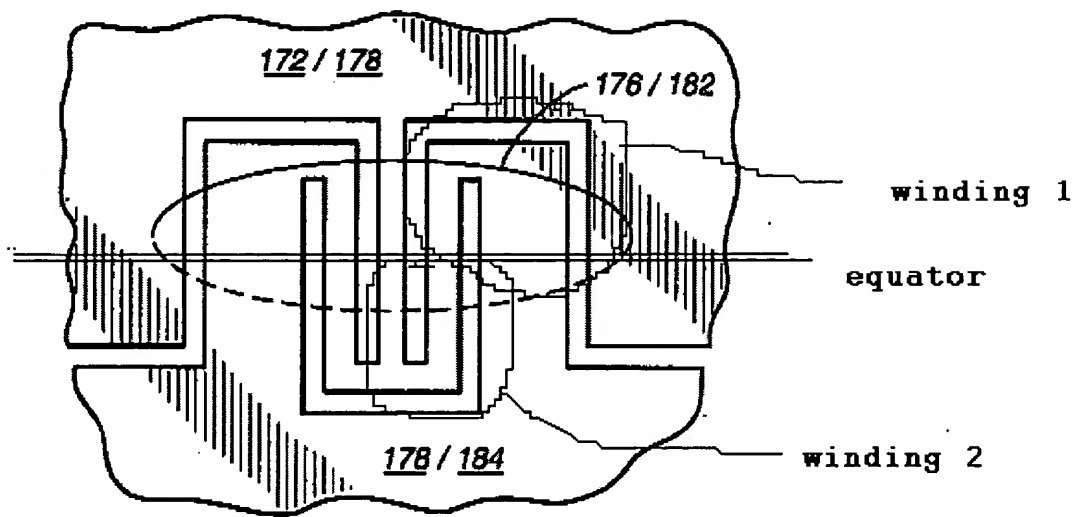
Neukermans does not disclose a specific damping element. McClelland discloses a similar optical deflector apparatus and teaches that the movable optical element may be damped by applying a damping material to various parts of the apparatus or by mechanically coupling separate damping devices to the moving structures (col. 13 lines 1-36). McClelland suggests that it may be desirable to provide higher damping for one of the rotation axes. Since the Neukermans apparatus is intended to be used in multiples in an optical switching array (see e.g. Fig. 18B), it would appear to be advantageous to damp one of the rotation axes particularly when the dimensions of the array are unequal. Thus it would have been obvious to a person having ordinary skill in the art to provide the Neukermans apparatus with a damping element as suggested by McClelland. The proposed modification meets the limitations of claim 16

Claim 17: A damping element is a damping means.

Claim 18: McClelland teaches application of a damping agent 57 to the hinges which define the rotation axes (fig. 14A). This teaching is incorporated into the proposed modification.

Claim 19: The damping agent taught by McClelland may be a polymeric material (col. 13 lines 12-18).

Claim 25: The Neukermans apparatus modified by the teaching of McClelland as discussed above with regard to claim 16 meets the limitations of claim 25. It is noted that each winding of the serpentine hinges gets progressively shorter from the optical element end to the support structure end. See the annotated fig. 14 below:



It is evident that winding 2 is shorter than winding 1, at least by virtue of the fact that its turn-around or switchback section is shorter than that of winding 1.

Claim 27: The Neukermans array modified by the teachings of McClelland as proposed above with regard to claim 16 meets the limitations of this claim. Inner moving frame 178 is a movable frame element (fig. 13). Electrodes 214 are the optical element driving elements. Frame driving elements are not specifically illustrated but are considered to inherently exist since the inner frame rotates and since the beam scanners are configured for scanning in two dimensions.

Claim 28: Neukermans discloses an array of the apparatuses 222 (see e.g. figs. 16-18b and 20a-20b).

Claims 29-30: The rotation axes are mutually perpendicular (fig. 13).

Claim 31: Optical element 184 includes a reflective surface 116.

Claims 33-39 and 41-42: The limitations of these claims are met by the modified Neukermans array as seen either by inspection or by reference to features which have already been identified above.

Response to Arguments

Applicant argued with regard to amended claims 16 and 27 that the previous Office action did not show anything in the prior art “in support of this suggestion to modify the systems described in the cited references”. However, no further modification was required in the previous rejection of claim 16. The disclosed optical element is a blocker, as elaborated in the above rejection of claim 16. It may also be noted that the blocker may comprise a mirror as suggested by claims 27 and 31.

Applicant’s arguments regarding claim 25 are noted but are believed to be moot in view of the annotated figure and comments presented above in the present rejection of claim 25.

With regard to the previously applied Plesko reference, Applicant argued that the previous Office action did not show how the suggested modification of Plesko would result in a shorter overall hinge length. Although it was believed that the result was obvious, a comparative illustration is included below.



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The diagram on the left corresponds to the configuration of Plesko fig. 16, whereas the diagram on the right corresponds to the proposed modification. Since the hinge arms generally conform to the peripheral shape of the base surrounding hole 60, the minimum hinge arm length of the Plesko fig. 16 configuration is about equal to the half the circumference of the base. Every successive hinge arm proceeding radially outward is longer than the preceding hinge arm. In contrast, in the proposed modification the *maximum* hinge arm length is about equal to half the circumference of the base surrounding hole 60, and every hinge arm proceeding radially outward is *shorter* than the preceding hinge arm. Therefore, given the same number, width, and spacing of hinge arms, the proposed modification will generally have a shorter overall hinge length than the Plesko fig. 16 configuration. Applicant also stated there was no motivation in the prior art. A person of ordinary skill in the art would be expected to understand that reducing the amount of material used usually corresponds to reduced material cost, and in the case of a device like this, it also reduces the rotational inertia as argued in the above rejection.

Allowable Subject Matter

Claims 6, 22, and 43-50 remain allowed as set forth in the last Office action. Claim 51 is now allowed in view of the amendment to overcome the indefiniteness rejection in the last Office action. Claims 24 and 40 are now allowed in view of the amendment to place their respective previously identified allowable subject matter into independent form. Claims 2, 4-5, 7-8, 10, 23 and 26 are now allowed since they were amended to depend from allowable base claims.

Conclusion


Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication should be directed to Mike Stahl at (571) 272-2360. Official communications which are eligible for submission by facsimile and which pertain to this application may be faxed to (703) 872-9306. Inquiries of a general or clerical nature (e.g., a request for a missing form or paper, etc.) should be directed to the technical support staff supervisor at (571) 272-1626.

MJS

Michael J. Stahl
Patent Examiner
Art Unit 2874
December 22, 2004


AKM ENAYET ULLAH
PRIMARY EXAMINER